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ART UNIT	**PAPER NUMBER**
1646	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/555,735	BLATT, LAWRENCE M.	
	Examiner	Art Unit	
	ZACHARY C. HOWARD	1646	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-20* is/are pending in the application.

4a) Of the above claim(s) *3,4 and 6-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 5* is/are rejected.

7)☒ Claim(s) *1* is/are objected to.

8)☒ Claim(s) *1 and 3-20* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/17/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application, Amendments and/or Claims

The amendment of 12/11/09 has been entered in full. Claims 1 and 5 are amended. Claim 2 is canceled.

Claim 1 contains two undocumented changes to the claim: (1) in line 5, the comma following the word "different" has been deleted without markings (strikethrough) indicating such, and (2) in line 8, a comma following the word "Mig" has been added without markings (underlining) indicating such. For purposes of facilitating prosecution these non-compliant changes are considered to be entered.

Claims 1 and 3-20 are pending.

Claims 6-20 remain withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claims 3 and 4 remain withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Claims 1 and 5 are under consideration, as they read upon the elected species of SEQ ID NO: 15.

Information Disclosure Statement

The Information Disclosure Statement of 10/17/08 has been considered.

Withdrawn Objections and/or Rejections

The following page numbers refer to the previous Office Action (8/20/08).

The objection to the Application Data Sheet at pg 2-3 is *withdrawn* in view of the new ADS filed on 12/11/09.

The rejection of claims 1 and 5 under 35 U.S.C. § 112, 1st at pg 7-9 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is *withdrawn* in view of Applicant's amendments to the claims.

The rejection of claims 1 and 5 under 35 U.S.C. § 102(b) at pg 9-10 as being anticipated by Barone et al (2002) is ***withdrawn*** in view of Applicant's amendments to the claims.

The rejection of claims 1 and 5 under 35 U.S.C § 102(a) at pg 10-11 as being anticipated by Clark-Lewis et al (2002) is ***withdrawn*** in view of Applicant's amendments to the claims.

Claim Rejections - 35 USC § 112, 1st paragraph, enablement

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. This rejection was set forth previously at pg 3-7 of the 8/20/08 Office Action.

Applicant's arguments (1/15/09; pg 4-9) as they pertain to the rejection have been fully considered but are not deemed to be persuasive for the following reasons.

In the response, Applicant argues that "[c]laim 1 is amended to recite a synthetic CXCR3 polypeptide ligand having a sequence of SEQ ID NO: 15, thus incorporating the limitation of [now canceled] claim 2" (pg 7) and that in view of this limitation "one of ordinary skill in the art reading the information disclosed throughout the specification coupled with what is known in the art at the time the patent application was filed would be able to make and use the invention" (pg 8).

Applicant's arguments have been fully considered but are not found persuasive. It is noted that claim 1 has not been amended to recite a polypeptide "having" (which is generally interpreted as equivalent to "comprising") but rather recites that the sequence of the synthetic CXCR3 is SEQ ID NO: 15, which is closed-type language equivalent to "consisting". As set forth in the section titled "Claim Rejections - 35 U.S.C., 112, 2nd

paragraph" below, the claim is indefinite because it also recites that the synthetic CXCR3 comprises a polypeptide of about 70 to about 125 amino acids in length. This indicates that the claim still encompasses variant polypeptides ranging from about 70 to about 125 amino acids in length. The amino acid sequence of SEQ ID NO: 15 is 98 amino acids in length. Therefore, claim 1 still encompasses variants of SEQ ID NO: 15 that are as short as 70 amino acids in length (or less, as the scope of "about 70" is undefined), and variants that are as long as 125 amino acids (or more, as the scope of "about 125" is undefined). Therefore, the portion of the rejection based on the variants encompassed by the claims is maintained for the reasons set forth previously. Applicant's arguments appear to concern only that genus of synthetic ligands "having" (interpreted as "comprising") SEQ ID NO: 15. However, this genus also lacks enablement for the reasons set forth previously and maintained herein. Applicant's remaining arguments concerning this genus are addressed below.

Applicant further argues that the "test for enablement is whether one reasonably skilled in the art could make or use the invention without undue experimentation from the disclosure in the patent specification coupled with information known in the art at the time the patent application was filed" (citing *United States v. Telectronics*, 1988) and that "well known subject matter is preferably omitted" (citing *Hybritech, Inc. v. Monoclonal Antibodies*, 1986). At page 8, Applicant points to the specification at pg 8, ¶ [0078] to [0089], pg 10-13, ¶ [0110] - [0134] and Figures 2-8 as teaching how to make the polypeptides of the invention, and that a skilled artisan "reading the specification as disclosed and using the techniques and skills routinely used in the field of molecular biology/chemistry and chemokine biology will be able to practice the claimed invention without any undue experimentation" (pg 9).

Applicant's arguments have been fully considered but are not found persuasive. Applicant's characterization of the case law (*United States v. Telectronics*, 1988; *Hybritech, Inc. v. Monoclonal Antibodies*, 1986) concerning enablement is not disputed. However, 35 U.S.C. 112, 1st paragraph requires that the description of the invention to enable a person of skill in the art to make and use the invention. Thus, in the instant case the specification must enable the skilled artisan to both make the claimed

polypeptides and to use the claimed polypeptides. With respect to a genus of polypeptides "having" (comprising) SEQ ID NO: 15 (which is the concern of the thrust of Applicant's arguments), it is recognized that the specification enables the skilled artisan to make such a genus. However, for the reasons set forth previously, it is maintained that the specification does not enable the skilled artisan to use such a genus.

Applicant further argues that the "proteins described in [the references cited in the rejection including Bork; Skolnick and Fetrow; Doerks et al; Smith and Zhang; Brenner; Bork and Bairoch; and Ferrer-Costa]" "are unknown proteins for which a function is to be ascribed to them based on known structures and vice versa" and are distinct from the claimed proteins. Applicant further argues that Skolnick et al teach at pg 36 that "[f]or proteins whose sequences identity is above ~30%, one can use homology modeling to build the structure. However, structure prediction is far more difficult for proteins that are not homologous to proteins with known structure". Applicant argues that the claimed polypeptide is "constructed from three different but well known chemokines (I-TAC, IP- 10 and Mig) that are (1) highly conserved in their sequences (> 30% homology; See FIG 2); (2) very similar in their functions (i. e. bind to and activate the CXCR3 chemokine receptor to cause Ca+2 level changes and control leukocyte migration); and (3) known to be structurally and functionally similar" (pg 6) and therefore "does not rely on the structure" alone and "the references do not apply" (pg 6). At pg 6-7, Applicant cites Wells at pg 8515 as providing that "although mutations in proteins may be additive, "[i]n the majority of cases, combination of mutations that affect substrate or transition-state binding and protein-protein interaction … are unlikely to alter grossly the structure and mode of binding". At pg 7, Applicant argues that the invention does not use a mathematical algorithm to predict the folding of unknown proteins, as taught by Ngo et al.

Applicant's arguments have been fully considered but are not found persuasive. The references cited in the rejection (including Bork; Skolnick and Fetrow; Doerks et al; Smith and Zhang; Brenner; Bork and Bairoch; and Ferrer-Costa) provide general teachings regarding the complexity of the problem of predicting protein structure from sequence data and in turn utilizing predicted structural determinations to ascertain

functional aspects of the protein. SEQ ID NO: 15 described by the specification is an "unknown protein" in so far as no specific functionality has been described for it other than that suggested by known structures (IP-10, I-TAC, Mig) from which it is derived; therefore it is not distinct from "unknown proteins for which a function is to be ascribed to them based on known structures and vice versa". In addition, the statement quoted from Skolnick et al is not disputed, however Skolnick et al also teach on the same page that "[k]nowing a proteins' structure does not necessarily tell you its function" (pg 36). Therefore, even if homology modeling was used to build a structure for SEQ ID NO: 15 (based on the structure of I-TAC, IP-10 or MIG), knowing this structure would not necessarily tell you its function. It is not disputed that the claimed invention does not use a mathematical algorithm as taught by Ngo et al, and instead relies on the structure and functions of the chemokines I-TAC, IP-10, and MIG. However, while the overall structures and functions of IP-10, I-TAC and Mig are taught by the specification, there are no teachings in the instant specification regarding the structure or functions of the particular domains (either separately or in combination) used in SEQ ID NO: 15: 1-22 (Mig residues 1-22 = signal sequence of Mig); 23-39 (I-TAC residues 23-39); 40-60 (IP-10 residues 40-60); 61-79 (Mig residues 61-79); 80-89 (I-TAC residues 80-89) and 90-98 (IP-10 residues 90-98). Thus, SEQ ID NO: 15 has six "subsequences" including two from each of IP-10, I-TAC and Mig. There is no guidance in the specification as to why these particular sequences were chosen to construct SEQ ID NO: 15, nor any guidance as to the function and structure imparted by each domain. The proposed sequences to be used might as well be any short sequences of amino acids taken from each of the three chemokines and placed in sequence. As set forth previously, it is unpredictable whether or not the changes present in one protein (IP-10, I-TAC or Mig) sequence can be used to make similar changes in one of the other sequences and retain functionality. The situation is analogous to that of orthologous proteins found in different animal species. As set forth previously, single amino acid changes can drastically affect protein functionality if occurring in a critical residue; thus, making a change to one protein based a related sequence may require additional compensatory changes elsewhere in the sequence. As noted in Ferrer-Costa (2007. J Mol Biol. 365: 249-256; cited

previously), non-human sequences may contain residues that are disease-associated in humans, but which are not disease-associated in the non-human animal: these changes are explained by compensatory changes elsewhere in the protein (see Abstract). In the instant case, there is no guidance that the sequences derived from IP-10 will be complemented by the changes presented by using them together with the sequences from I-TAC and Mig (i.e., there is no guidance that the six subsequences will work together).

Applicant's characterization of the teachings of Wells is disputed. Applicant quotes from two different sentences of Wells (in the same paragraph), which read (in full): "[i]n the majority of cases, combination of mutations that affect substrate or transition-state binding and protein-protein interaction, DNA-protein recognition, or protein stability exhibits simple additivity. Simple additivity is commonly observed for distant mutations at rigid molecular interfaces such as in protein-protein and DNA-protein interactions, wherein the mutations are unlikely to alter grossly the structure and mode of binding" (pg 8515). It is clear from the full quotation that Wells is not generally stating that combinations of mutations are unlikely to alter grossly the structure and mode of binding, but rather that simple additivity is observed for particular mutations that are unlikely to grossly alter structure and mode of binding. Furthermore, these mutations are stated to alter the function of the protein (e.g., protein-protein binding) despite the lack of structural alteration. Thus, the statements by Wells indicate that combinations of mutations that do not "grossly alter" the structure of the proteins can nevertheless alter "substrate or transition-state binding and protein-protein interaction" (i.e., even if the structure is not altered, the functionality can be).

Applicant further argues that because the "synthetic CXCR3 polypeptide ligand is derived by "joining" in-sequence distinct subsequences of the various domains of the three chemokine ligands that are highly conserved in their amino acid sequences (See, Fig 2 for alignment of all three sequences) at the specific "break-points" between domains and subdomains with no amino acid changes being made within these domains and subdomains, it is unlikely that such a synthetic polypeptide would not fold into its correct 3-dimensional structure and retain its functional activity. Applicant argues

that the synthetic polypeptide has been "carefully designed" "to enhance or minimize certain functions (e.g. receptor activation, calcium mobilization etc) by swapping these domains at specific "break-points" within the domain and subdomains from all these three chemokines. Applicant further argues that "[a]ll three chemokines contain the same basic structure - a CXC domain containing subdomains: (1) the triggering domain from amino acids 22-31 (this triggering domain cause activation of the receptor upon binding to the receptor via the docking loop) at the N-terminus of the matured protein after the signal sequence have been cleave off, and (2) the docking loop from amino acids 32-38. The CXC domain containing both the triggering domain and docking loop is then followed by two strands at about amino acids 45 to about amino acid 69 and a helix from about amino acid 80 to about amino acid 89. There are two disulfide bonds between amino acids 30 and 57, and 32 and 74" (pg 8). Applicant further argues that "since the domains in the synthetic polypeptide are similar to those of the native ligands, the ability to activate and mobilize CXCR3 receptors to result in enhanced or diminished activity will depend on sequences of the triggering and docking domains of the polypeptide replaced (pg 9).

Applicant's arguments have been fully considered but are not found persuasive. The instant specification contains no teachings regarding "break-points", "domains", "subdomains", "triggering domains", "docking loops", "strands", "sheets" or disulfide bonds" of I-TAC, IP-10 and Mig. Hence, all of these teachings constitute material not included in the specification as originally filed. Furthermore, all these teachings constitute attorney argument that is unsupported by any evidence of record (either in the specification or the literature as published). Furthermore, Applicant provides no evidence that specific fragments of these chemokines can predictably be "shuffled" with other fragments and generate a functional protein.

Applicant further argues that "that a working example need not be disclosed in order to satisfy the enablement requirement of 35 U.S.C § 112, first paragraph" (referring to MPEP § 2164.02 at 2100-196, left col., first paragraph)"; "that it is inappropriate to conclude that experimentation is undue based on the mere

unpredictability of the results of an experiment" and than an applicant "need not have actually reduced the invention to practice prior to filing (citing *Gould v. Quigg* (1987)).

Applicant's arguments have been fully considered but are not found persuasive. Although Applicant needs not to have actually reduced the invention to practice prior to filing the application, the lack of a working example is only one factor to be considered, especially in a case involving an unpredictable art (MPEP § 2164.02). Furthermore, the instant rejection is not based on a conclusion that is undue based on the mere unpredictability of the results of an experiment. Instead, the rejection set forth previously and maintained herein is based on consideration of the following "Wands factors": 1) nature of the invention, 2) state of the prior art, 3) relative skill of those in the art, 4) level of predictability in the art, 5) existence of working examples, 6) breadth of claims, 7) amount of direction or guidance by the inventor, and 8) quantity of experimentation needed to make or use the invention. *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). Even if the claims were amended to clearly limit the claimed polypeptide to one "having" (comprising) SEQ ID NO: 15, and the specification might outline how to make such, this is still an invitation to the skilled artisan to use the current invention as a starting point for further experimentation. The "amount of direction or guidance by the inventor" is minimal regarding the functionality of the protein. While the quantity of experimentation to assay whether a protein of SEQ ID NO: 15 has a function of I-TAC, IP-10 or Mig is not alone undue, consideration of the quantity of experimentation that must be considered is that this protein may not share any function with I-TAC, IP-10 or Mig, and the skilled artisan would then have to engage in further experimentation in order to find a "use" for the otherwise non-functional protein.

New objections and/or rejections necessitated by Applicant's amendment

Claim Objections

Claim 1 is objected to because of the following informalities:

(1) In the amendments to claim 1, the word "to" has been deleted in line 5. However, the claim now recites "...corresponding in amino acid identity and number

sub-sequences of each naturally occurring..." (lines 4-5). This is grammatically awkward. The word "to" should be reinstated.

(2) In claim 1, line 1, the subject of the claim is referred to as a "synthetic CXCR3 polypeptide ligand". In claim 1, line 8-9, the subject is referred to as a "synthetic CXCR3". For clarity, the same terminology should be used in both locations (i.e., lines 8-9 should also recited "synthetic CXCR3 polypeptide ligand").

Appropriate correction is required.

Claim Rejections - 35 USC § 112, 2nd paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because the claim first recites that the "A synthetic CXCR3 polypeptide ligand comprising a polypeptide of from about 70 to about 125 amino acids in length" but then also recites "wherein the amino acid sequence of the synthetic CXCR3 is SEQ ID NO: 15". The latter statement indicates that the "synthetic CXCR3" has a sequence of SEQ ID NO: 15 (i.e., "consists" of SEQ ID NO: 15, a sequence of 98 amino acids), but the former statement indicates that the "synthetic CXCR3" can comprise a polypeptide comprising a polypeptide of from about 70 to about 125 amino acids. It is unclear how the "synthetic CXCR3" can be a 98 amino acid sequence but also comprise a polypeptide comprising from about 70 to about 125 amino acids. This situation is equivalent to having a broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim). A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and

Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 1 recites the broad recitation "synthetic CXCR3 polypeptide ligand comprising a polypeptide of from about 70 to about 125 amino acids in length", and the claim also recites that the synthetic CXCR3 is SEQ ID NO: 15 (98 amino acids in length), which is the narrower statement of the range/limitation.

Claim 1 is further indefinite because the claim first recites that the "synthetic ligand" optionally "further including an additional methionine attached to the ordinarily first amino acid at the N-terminus" and then also recites that "wherein the amino acid sequence of the synthetic CXCR3 is SEQ ID NO: 15". SEQ ID NO: 15 includes a methionine at the N-terminus. It is unclear whether the first recitation refers to this methionine (which is optionally removed), or an additional methionine placed in front of the methionine of SEQ ID NO: 15. If the N-terminal methionine of SEQ ID NO: 15 is to be optionally removed, it is unclear how the latter recitation will still be met (i.e., "wherein the amino acid sequence of the synthetic CXCR3 is SEQ ID NO: 15" is not met if the N-terminal methionine of SEQ ID NO: 15 is removed.

Claim 5 is rejected for depending from claim 1 and encompassing the same indefinite subject matter.

Conclusion

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary C. Howard whose telephone number is 571-272-2877. The examiner can normally be reached on M-F 9:30 AM - 6:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary B. Nickol can be reached on 571-272-0835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Z. C. H./
Examiner, Art Unit 1646

/Bridget E Bunner/
Primary Examiner, Art Unit 1647